

# HANGAR AE



Hangar AE at Cape Canaveral Air Force Station in Florida is the NASA Launch Services Program's Launch Data Station.

**B**uilt in 1958, Hangar AE originally was built for a Department of Defense missile program at Cape Canaveral Air Force Station. The facility was acquired in 1960 by NASA and modified for unmanned missions.



specific launch system allows the government to execute its insight into contractor processes and operations without relying on contractor-developed systems.

The facility was used for prelaunch preparations and checkout of NASA payloads launching on an expendable launch vehicle or, occasionally, on the space shuttle.

The Hangar AE control rooms provide real-time voice, data and video information for expendable vehicle checkout and launch operations, and can be reprogrammed to support any of the unmanned vehicle fleet.

Unlike the Launch Control Center on NASA's Kennedy Space Center, the Hangar AE facility does not provide launch command. That function is provided from various block houses or command centers, depending on the launch pad used. However, all telemetry data from the vehicle during flight is received, recorded and displayed at Hangar AE.

Each console in the LVDC has a multichannel voice instrument called a MOCS3 (Mission Operation Communication System version 2). Other areas have 24-channel versions of the MOCS3. Each console has access to an administrative telephone and a network line for use with a laptop computer, if required.

The building contains a Class 10k horizontal laminar flow clean room complex; a telemetry ground station; an extensive communications center for data, voice and video; three launch vehicle data centers (LVDCs); the Mission Director's Center (MDC); and offices for payload and contractor personnel.

## MISSION DIRECTOR'S CENTER (MDC)

The Mission Director's Center is in the LSP's East Coast Data Station in Hangar AE.

The MDC is designed for the use of senior managers to support ground testing and launch any

NASA's Launch Services Program (LSP) uses this facility as its communications center. The entire building is environmentally controlled.

Hangar AE has evolved as a facility to allow independent verification and validation of vehicle and spacecraft telemetry for unmanned launch operations. This separation from the vehicle

### MDC by the numbers

- Seats 36, including two on a console for Public Affairs
- In-room support from operations staff
- Fully configurable voice, video and data systems
- Multiple HD cameras

NASAfacts



From their consoles in the Mission Director's Center at Cape Canaveral Air Force Station, launch controllers monitor a launch vehicle and spacecraft prior to liftoff. The Telemetry and Communications Group provides data, voice, video and telemetry for NASA launches around the globe -- even as far away as Alaska and the Marshall Islands.

vehicle in the U.S. fleet. Although the MDC has been in use for launch operations since the early 1960s, it had a major face lift in 2002 that included both safety and cosmetic upgrades and increased the number of customers that could be supported. With the modular design of the systems, the MDC can support both East Coast and West Coast missions.

With modern systems, the MDC will ensure the reliability and safety of the NASA launch fleet for many years to come.

### LAUNCH VEHICLE DATA CENTER (LVDC)

Kennedy Space Center's new world-class Launch Vehicle Data Center (LVDC) was successfully christened with the April 7, 2001, launch of a Delta II rocket boosting the 2001 Mars Odyssey spacecraft toward the Red Planet.

The new LVDC has three control rooms to support multiple and larger operations. The three rooms have replaced the single LVDC control room used since the mid-1970s.

The LVDC was developed by NASA KSC to support multiple test operations in parallel or a single large launch operation. The LVDC works in tandem with the adjacent Mission Director's Center, the control room where NASA launch

#### LVDC by the numbers

- Three control rooms, each seating 24-30 (capacity of all, 72-90).
- One spacecraft ground support equipment (GSE) area, seating 8-10
  - Executive suite, seating 8-10
  - Winds room (provides area for customer ground equipment.
  - Public Affairs room, seating two

The support rooms can be tied to NASA's West Coast control rooms at Vandenberg Air Force Base for bicoastal support.

managers monitor expendable vehicle launches, and where the final decision to launch is made.

The video system takes up to 150 inputs from all areas of CCAFS and Kennedy. Each console can select from these inputs. Each LVDC has two high quality video cameras with electronic pan, tilt and zoom features, and two 84-inch projector monitors and four 40-inch flat plasma monitors.

### TELEMETRY LAB (TMLAB)

The Telemetry Lab is designed to process the ground or airborne telemetry streams of any launch vehicle in the U.S. fleet and also has supported numerous spacecraft as well.

The TMLAB has seen numerous evolutionary upgrades since it began operating in the early 1960s. Starting with the analog systems and vacuum tubes in the '60s and '70s to paper strip-chart recorders and integrated circuits of the '80s and '90s to the modern digital computer-based systems of today, a measured technology upgrade continues to evolve.

The current TMLAB routinely supports multiple, simultaneous launch vehicles from both east and west coasts and boasts an online archive of launch vehicle telemetry stretching back over 15 years.

The software used by TMLAB customers, called Iris, is a highly robust, highly flexible cloud-based system, which can display any measurements from the current and any archived launch vehicles. Iris also is both scalable and portable and can securely display data to any user, anywhere in the world.

When Iris is combined with the TMLAB's connectivity to NASA, the U.S. Air Force, and commercial downrange sites and networks, LSP can be safely said to have succeeded in its goal of supporting any vehicle, any time, and at any location in the world.



A view of the Telemetry Lab on Feb. 14, 1967.

# Historic timeline

1956



The Vanguard project arrived at the Cape. The project intended to be self-contained to the maximum extent possible, and as such, had its own telemetry stations. They were located in trailers at the T-Pad, Hangar C, and later, Hangar S.

1960



When the Vanguard project was reaching the end of its planned set of launches, NASA took over responsibility for supporting the launch vehicle, Thor, which was later renamed Delta. Support was provided from Hangar H and additional trailers.

1963



The expendable launch vehicle data station moved out of trailers and into Hangar AE and established both the Mission Director Center (MDC) and the Launch Vehicle Data Center (LVDC).

1998



LSP is born at Kennedy Space Center and is responsible for NASA oversight of launch operations and countdown management. Hangar AE was involved in a multiyear project to upgrade the telemetry processing system and voice switching system.

Current



Beginning with basic infrastructure and continuing with a remodeling of the MDC and LVDCs, the program has continued with a measured, well-planned series of construction projects to assure the long-term viability of Hangar AE as a resource.

# Historic launches



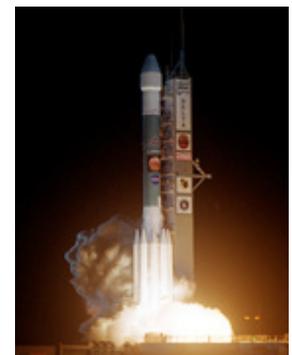
In 1975, Hangar AE supported the Viking Program. All Titan/Centaur operations were the responsibility of the Kennedy Space Center's Unmanned Launch Operations Directorate.

Interstellar Boundary Explorer (IBEX) launches from the U.S. Army's Ronald Reagan Ballistic Missile Defense Test Site on Kwajalein Atoll in the Marshall Islands, Oct. 19, 2008.



A Boeing Delta II rocket propels Deep Space 1 through the morning clouds after liftoff from Launch Complex 17A, Cape Canaveral Air Force Station, on Oct. 24, 1998. It is the NASA Launch Services Program's first official launch.

In 2003, NASA Launch Services Program launches its first and second Mars Exploration Rovers (MER-A & MER-B or Spirit & Opportunity) aboard Delta II launch vehicles. The bright glare briefly illuminated Florida Space Coast beaches in this launch of MER-B on July 7, 2003.



# Recent support

## TDRS-L



NASA and contractor managers and engineers monitor progress of the countdown for the launch of the agency's Tracking and Data Relay Satellite, or TDRS-L, spacecraft atop a United Launch Alliance Atlas V rocket Jan. 23, 2014, in the Hangar AE Launch Vehicle Data Center at Cape Canaveral Air Force Station in Florida.

## SpaceX



The NASA Launch Services Program at the Kennedy Space Center provided independent monitoring of SpaceX's new launch vehicle from Hangar AE. LSP continues to work with SpaceX for independent processing of telemetry data.

## Commercial and other DoD support



LSP continues to support commercial reimbursable missions by providing support for telemetry and other requested services from Hangar AE. At left is a United Launch Alliance Atlas V rocket launching from Space Launch Complex 41 at Cape Canaveral Air Force Station in Florida.

To view the latest Kennedy Space Center fact sheets, go to <http://go.nasa.gov/11KR0r6>.

National Aeronautics and Space Administration

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